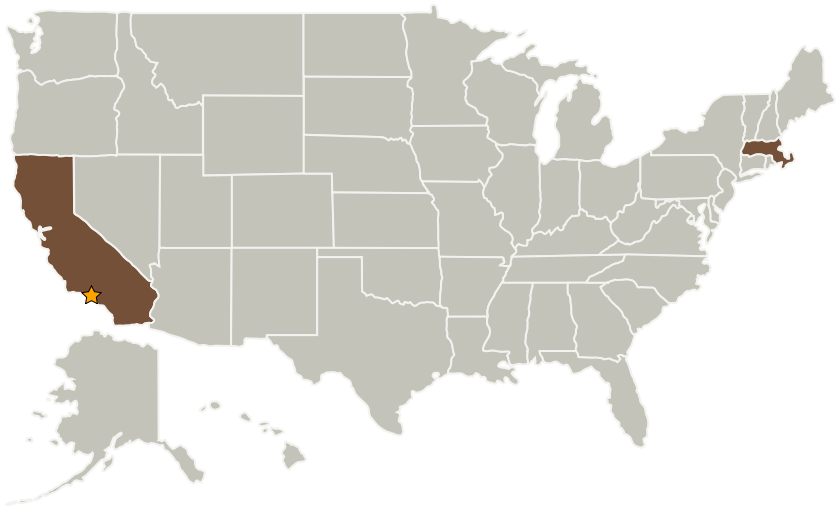
Universal Brushless-DC Motor Controller for Space Applications, Phase I

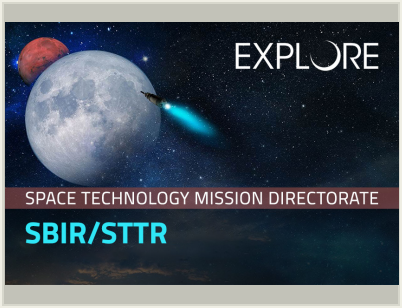
Completed Technology Project (2006 - 2006)

Project Introduction

The goal of this SBIR is to adapt an initial prototype ultra-miniature high-performance brushless-DC-motor controller, code named 'Puck', for use by NASA across a wide range of motor drives. The Puck was recently developed by Barrett for terrestrial mobile-manipulation uses where efficiency, low mass, and robustness are critical factors. While quite small (<50 grams), the controller can pump from milliamps to several amps continuous. Several features of this controller make it a candidate for NASA's wide range of needs for servomotor control in the demanding environments of extra-terrestrial and interplanetary exploration. One of the key enabling design strategies that led to the Puck is elimination of transmission lines through total integration of power conditioning, rotor-position optics, and commutation into a single tiny module. The module is small and energy efficient enough to make casting within high-heat-conduction plastic feasible. Pure conduction cooling, a distinct advantage for NASA applications, is unusual for motor amplifiers which are generally cooled by natural convection or forced air. The hermetically-sealed packaging also excludes lunar or Martian dust from affecting robustness. The primary strategy for this technology to avail for NASA will be to minimize the effects of radiation while enabling self-diagnosis, self-repair, and ultimately easy change-out.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Barrett Technology, LLC	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Newton, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.10 Turboelectric Propulsion